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# Eye Movement of Stutterers During Oral Reading

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show quantitatively the influence of this cue upon non-troublesome words.

The stutterer read a one-hundred word passage to the experimenter two successive times. A cue sheet was then prepared on which all the troublesome words in the two previous trials were marked as were also five additional non-troublesome words. This cue sheet was given to the stutterer, who was told that all marked words represented his troublesome words in the two previous trials. The stutterer read the passage a third and fourth time successively.

Five non-troublesome unmarked words were used as control words. The cue words showed an average of 1.6 more stuttering reactions than the control words for the two final readings. This increase is significant since it is more than three times the S.E. which is .49. The average per cent increase of stuttering reactions on the cue words was 16.

The results so far justify two conclusions which are subject, of course, to any alterations which further research findings may dictate.

1. This study shows quantitatively that stuttering experienced in an audience situation tends to be followed by an increase of stuttering reactions in later non-troublesome situations, when the cues of color and content, representative of the former, are also present in the latter situations.

2. It shows quantitatively that stuttering experienced on troublesome words tends to be followed by an increase of stuttering reactions on certain non-troublesome words when a cue representative of the former is also associated with the latter words.

These findings are of importance to the clinician because they demonstrate experimentally that more stuttering will occur under situations which are associated with past stuttering.

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## EYE MOVEMENT OF STUTTERERS DURING ORAL READING

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This study is an attempt to evaluate the meaning of the eye movements of stutterers during oral reading.

The apparatus used was the eye-voice camera as developed by

Tiffin and Fairbanks. The camera is so developed as to enable the simultaneous photographing of eye movements and the voice, thus permitting a determination of what both eyes and voice are doing at any given moment of time. A phonographic record of the stutterers voice was also cut simultaneously with the running of the film, this aided in locating the words on the voice line.

The data secured up to this point, in this study, indicate a number of interesting things, when compared with the data obtained by Fairbanks in a study on the eye movements of good and poor readers during oral reading.[1] In the first place, the average number of fixations per stutterer per line in 23.1 compared with 12.3 for poor readers and 9.4 for good readers. The average duration of these fixations is .52 sec. compared with .25 sec. of good readers. These abnormally long average fixations can be explained by the fact that during the actual stuttering spasm fixations of from one third of a sec. to six sec. occur. The large number of fixations may also partially be explained on the basis of the number and duration of spasms. For the stutterer, reading orally, there is an average of four regressions per line. Fairbanks shows that the mean number of regressions per line for good readers is 1.6 and for poor readers 3.4. This is even more significant when we consider that 80 per cent of these regressions occur during the spasm. During normal reading (orally) the data show that the effective span of the stutterer is 8.2 per cent of the line as compared with 8.02 for poor readers and 10.5 per cent for good readers. However during the spasm the effective eye span is decreased to 3.5 per cent of the line, a decrease of over 250 per cent.

When the stutterer, reading orally, goes into a spasm, generally speaking two things may happen. If the spasm is clonic the eyes may continue to follow the printed line, the duration of fixation becoming longer and the amount of forward shift decreasing, or the eyes may fixate all around and on the spasm word. During the clonic spasm the duration of any one fixation rarely will exceed one sec. If the spasm is tonic, then almost invariably the eyes fixate all around the close vicinity of, and on the spasm word. It is during the tonic spasm that the abnormally long fixations of from one to six sec. occur. This is one of the most interesting bits of evidence so far revealed by this study. The tonic spasm occurs when there is a complete block. These abnormally long fixations lead to the belief that this total block not only affects the speech mechanism as a whole, but also spreads to other organs

1 Fairbanks, G., Eye Movements of Good and Poor Readers During Oral Reading 1935, In Press.

threshold for perception of temporal differences as determined by such as the eyes. By means of specific directions these long fixations have been voluntarily reproduced in the eye movements of normal good readers, during oral readers.

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## STUTTERING IN RELATION TO VARIOUS SPEECH SOUNDS

WENDELL JOHNSON AND SPENCER F. BROWN

Thirty-two stutterers read over 300,000 words, stuttering in relation to over 30,000 of them. Stuttering was analyzed with reference to its relative frequency in relation to specific sounds, and conclusions were drawn with reference to the problem of the precipitation of a moment of stuttering.

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## INTENSIVE AND DURATIVE ASPECTS OF THE INTERPRETATION OF A MUSICAL SCORE

ARNOLD SMALL

The purpose of this study was to determine how closely the violinist follows the printed score in assigning temporal and intensity values to notes and to demonstrate some ways in which duration and intensity are utilized in stress and phrasing.

The strobophotographic technique has been utilized in the analysis of a performance by the writer of Bach's Air for the G-string. The intensive and durative factors discussed here are extracted from this analysis.

An exact division of the duration of the measures was made into parts corresponding to the printed note values. These are compared with time values actually given the notes in performance.

Of the forty-four notes so treated only six show exact correspondence between computed and performed durations. Thirty deviated three-twentieths of a second or less from the mathematically determined values. This is below or so very near the average